DOCUMENT RESUME

ED 031 704 AL 002 052

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Language, Thought and Memory in Linguistic Performance, A Thought View.

Pub Date Mar 69

Note-17p.; Paper given at the Third Annual TESOL Convention, Chicago, Illinois, March 5-8, 1969.

EDRS Price MF-$0.25 HC-$0.95

Descriptors-*Language, Language Instruction, Linguistic Competence, *Linguistic Performance, *Linguistic Theory, *Memory, *Thought Procerses, Transformation Theory (Language)

The contrasting views of Saussure and Bloomfield ("mentalist" versus "mechanist"), the hypotheses of Whorf showing the influence of language on certain habits of thought, and Chomsky's notion of generative transformational grammar in the context of language use are reviewed. The author notes the limits of these systems and suggests that in dealing with linguistic performance, time and speed, length and memory, and non-linguistic thought (five factors which Chomsky does not deal with) are involved and relevant. He posits the following hypotheses that go beyond Chomsky's view of competence: (1) Thought and language are distinct, and both are involved in performance. (2) Thought is central and language is a symbolic system that refers incompletely to it. (3) Immediate memory works with utterances and texts; longer term memory works with thought. (4) If (3), then translation will show greater interference across languages than delayed recall. (5) If relating thought and language simultaneously at normal speed and under normal thought density constitutes performance, then exercises that involve such performance should increase learning and motivation in foreign language teaching. This tentative "thought" view is presented in its present form in the hope that it will be "stimulating and thought provoking." (AMM)

EDO 31704

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LANGUAGE, THOUGHT AND MEMORY IN LINGUISTIC PERFORMANCE, A THOUGHT VIEW

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1. INTRODUCTION

I present in tentative terms a "thought" view of linguistic performance which is developing and being put to various empirical and rational tests. I do not hesitate to discuss it in its present form in the hope that it will be stimulating and thought provoking.

To gain perspective and see where this view fits into linguistic ideas, let's begin with some selected key positions on the relation of language and thought. The views of Saussure (1915) and Bloomfield (1933) contrast sharply and must be considered. Whorf's hypotheses (1941) are of obvious interest, and Chomsky (1957, 1965, 1968) and his notion of generative transformational grammar in the context of language use is relevant. After noting the limits of these systems, the thought view and three pilot experiments are discussed.

2. PERSPECTIVE

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Saussure

Two relevant aspects of Saussure's view on language and thought as gleaned from the Course in General Linguistics (1915, translation 1959) are the process of language in use and his notion of language versus thought.

With regard to the process of language in use,

Saussure says:

> "Suppose that two people, A and B, are conversing with each other:

> "Suppose that the opening circuit is in A's brain, where mental facts (concepts) are associated with representations of the linguistic sounds (sound-images) that are used for their expression. A given concept unlocks a corresponding sound-image in the brain; this purely psychological phenomenon is followed in turn by a physiological process: the brain transmits an impulse corresponding to the image to the organs used in producing sounds. Then the sound waves travel from the mouth of A to the ear of B: a purely physical process. Next, the circuit continues in B, but the order is reversed." (p. 11-12)

With regard to thought and language he says:

> "Psychologically our thought--apart from its expression in words--is only a shapeless and indistinct mass. Philosophers and linguists have always agreed in recognizing that without the help of signs we would be unable to make a clear-cut, consistent distinction between two ideas. Without language, thought is a vague, uncharted nebula. There are no pre-existing ideas, and nothing is distinct before the appearance of language." (p. 111-112)

This view can be challenged today on the basis of the research of cognitive psychologists such as Bruner (1967) and on the basis of inferences shown below.

Bloomfield

It is not easy to summarize pertinent aspects of Bloomfield's view of language and thought in Language (1933) because of the nature of the problem and because of internal contradictions in the book itself. With regard to the process of language use he says:

> "2.2 Suppose that Jack and Jill are walking down a lane. Jill is hungry. She sees an apple in a tree. She makes a noise with her larynx, tongue, and lips. Jack vaults the fence, climbs the tree, takes the apple, brings it to Jill, and places it in her hand. Jill eats the apple.
>
> "This succession of events could be studied in many ways, but we who are studying language, will naturally distinguish between the act of speech and the other occurrences, which we shall call practical events. Viewed in this way, the incident consists of three parts, in order of time:
>
> "A. Practical events preceding the act of speech.
> "B. Speech.
> "C. Practical events following the act of speech.
>
> "We shall examine first the practical events, A and C. The events in A concern mainly the speaker, Jill. She is hungry; that is, some of her muscles were contracting, and some fluids were being secreted especially in her stomach. Perhaps she was also thirsty; her tongue and throat were dry. The light waves reflected from the red apple struck her eyes. (p. 22-23)
>
> "...Accordingly, we say that speech-utterance, trivial and unimportant in itself, is important because it has a meaning: the meaning consists of the important things with which the speech-utterance (B) is connected namely with the practical events (A and C)." (p. 27)

Bloomfield distinguishes between mentalists and mechanists in the study of language. The mentalist defines the meaning of a linguistic form as the characteristic mental event which occurs in every speaker and hearer

in connection with the utterance. The speaker who utters the word apple has had a mental image of an apple. For the mentalist, language is the expression of ideas, feelings, or volitions.

> "The mechanist does not accept this solution. He believes that mental images, feelings, and the like are merely popular terms for various bodily movements..." (p. 142)

Bloomfield considered himself a mechanist, and dealt with language as forms. His effort was to study language as physical phenomena. Thought is far removed from this view.

Whorf

Whorf (1941), highlighting the influence of SAE (Stardard Average European) and Hopi on the thought of its respective speakers, implies a distinction between his "Linguistic Meaning, residing in the name or the linguistic description commonly applied to the situation" and "the habitual thought worlds of SAE and Hopi speakers."

> "By 'habitual thought' and 'thought world' I mean more than simply language, i.e. than the linguistic patterns themselves. I include all the analogical and suggestive value of the patterns (e.g., our 'imaginary space' and its distant implications), and all the give-and-take between language and the culture as a whole, wherein is a vast amount that is not linguistic but yet shows the shaping influence of language. In brief, this 'thought world' is the microcosm that each man carries about within himself, by which he measures and understands what he can of the macrocosm." (in Carroll 1956, p. 147)

Obviously his term "habitual thought" implies a non-habitual thought also. His "linguistic meaning" refers to the content side of language. His habitual thought world plus the implied non-habitual thought world are included in the "thought" view of language use.

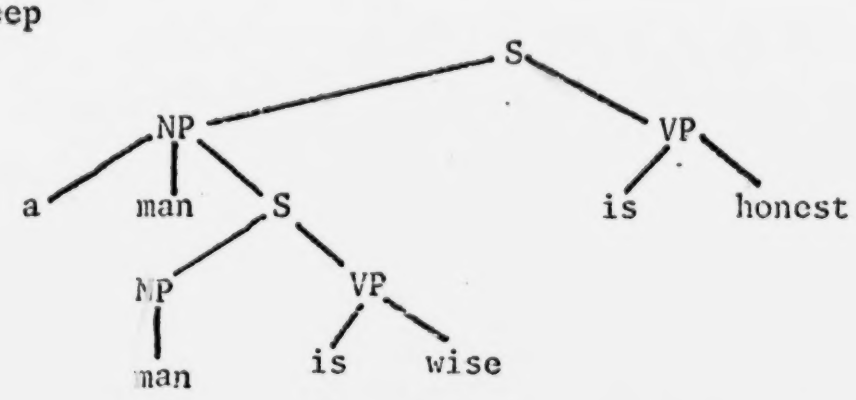
But Whorf was trying to show the influence of language on certain habits of thought--an interesting problem in its own right--and not on the relation between thought--habitual and creative--and language in actual performance.

Chomsky

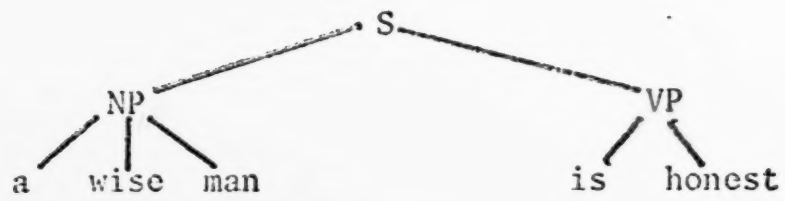
In the post Bloomfieldian scene when form dominated the stage, Chomsky argued convincingly that language could not be explained adequately via taxonomy of forms alone. He re-introduced rationalism.

> "I believe that the most appropriate general framework for the study of problems of language and mind is the system of ideas developed as part of the rationalist psychology of the seventeenth and eighteenth centuries, elaborated in important respects by the romantics and then largely forgotten as attention shifted to other matters. According to this traditional conception, a system of propositions expressing the meaning of a sentence is produced in the mind as the sentence is realized as a physical signal, the two being related by certain formal operations that, in current terminology, we may call grammatical transformations. Continuing with current terminology, we can thus distinguish the surface structure of the sentence, the organization into categories and phrases that is directly associated with the physical signal, from the underlying deep structure, also a system of categories and phrases, but with a more abstract character. Thus, the surface structure of the sentence "A wise man is honest" might analyze it into the subject "A wise man" and the predicate "is honest." The deep structure, however, will be rather different..." (p. 25)

Deep



Surface



(p. 25-26)

> "How are the deep and surface structures related? Clearly, in the simple example given we can form the surface structure from the deep structure by performing such operations as the following:
>
> "a. assign the marker wh- to the most deeply embedded NP, "man"
> "b. replace the NP so marked by "who"
> "c. delete "who is"
> "d. invert "man" and "wise" " (p. 26)

As we consider the example above, it may seem that the explanation is more complicated than the thing explained. Further, children learn to use the adjective-noun construction before they use the full sentence construction. Also, the speaker does not go through the mental steps of deriving the adjective construction every time he uses it, etc.

Chomsky, of course, does not say that speakers do it this way. He is talking about competence, not performance. He is explaining within a formalized system how he can explain these constructions as deriving from underlying deep structures (how they can be 'generated.') To quote him:

> "We have now discussed a certain model of competence. It would be tempting, but quite absurd, to regard it as a model of performance as well. Thus we might propose that to produce a sentence, the speaker goes through the successive steps of constructing a base-derivation, line by line from the initial symbols, then inserting lexical items and applying grammatical transformations to form a surface structure, and finally applying the phonological rules in their given order, in accordance with the cylic principle discussed earlier.

> There is not the slightest justification for any such assumption. In fact, in implying that the speaker selects the general properties of sentence structure before selecting lexical items (before deciding what to talk about), such a proposal seems not only without justification but entirely counter to whatever vague intuitions one may have about the processes that uderlie production."
> (in Lenneberg 1967, p. 436-437)

3. THE THOUGHT VIEW

Under competence, then, Chomsky is attempting to explain all the constructions of a language and of language in general. He hopefully can do this with an extended formalized treatment of each set of rules without regard to time and speed, length and memory, and non-linguistic thought. Yet, it seems to me that in typical language use, that is, in linguistic performance, all five are involved and relevant.

In order to deal with linguistic performance I need the following hypotheses that go beyond Chomsky's view of competence. (1) Thought and language are distinct, and both are involved in performance. (2) Thought is central and language is a symbolic system that refers incompletely to it. (3) Immediate memory works with utterances and texts; longer term memory works with thought. This hypothesis will be used to support (1) and (2) by inference. (4) If (3), then translation will show greater interference across languages than delayed recall. (5) If relating thought and language simultaneously at normal speed and under normal thought density constitutes performance, then exercises that involve such performance should increase learning and motivation in foreign language teaching.

1. With regard to the first hypothesis, that thought and language are distinct and are both involved in performance, there are a number of arguments and bits of evidence that seem sufficient to sustain it.

(i) Thought is multidimensional; it may encompass simultaneously space, movement, color, sound, touch, smell, subjectivity (I, you, he etc.). Language is linear; one thing must follow the other. When one thinks of a particular house, the thought can include size, color, material, style, age, ownership, etc. simultaniously. In talking about it, one has to refer to each of these features separately and report them in separate words that must follow one upon another.

(ii) Thought does not originate fully encoded in the words, phrases, and sentences of a particular language. The following quotation from Vygotsky (1962) clarifies this point and supports (i) as well.

> "Thought, unlike speech, does not consist of separate units. When I wish to communicate the thought that today I saw a barefoot boy in a blue shirt running down the street, I do not see every item separately: the boy, the shirt, its blue color, his running, the absence of shoes. I conceive of all this in one thought, but I put it into separate words. A speaker often takes several minutes to disclose one thought. In his mind the whole thought is present at once, but in speech it has to be developed successively." (p. 150)

(iii) Thought does not occur typically in single sentences. It is only when we refer to thought via a particular language that we must divide it up into sentences. And to refer to typical thought complexes we need series of sentences rather than isolated sentences.

(iv) There are observable differences in the time it takes to explain the solution in a connected oral or written report. Although presumably one could use inner speech at a rapid rate, the observable

differences in time between thinking and verbal report are more dramatic than this explanation can account for, and intuitively one does not have the notion that inner speech is involved. The notion one has is one of insight. I conducted a pilot experiment in which Ss were shown a traffic pattern from a road sign and were asked to nod when they understood it. They were then asked to explain what they had understood. The verbal report took longer than the study time.

(v) There are observable differences between errors of thought, i.e. things or operations that Ss understand incorrectly, and errors of verbal report: those that they understand correctly but report incorrectly. Their correct understanding can be demonstrated by actions, e.g. they can be asked to operate a machine, give the solution to a problem, etc. Yet the verbal report if followed literally leads to an incorrect operation or solution.

(vi) There are several types of thought that develop before language and are therefore possible without language. Bruner, et al., (1967) demonstrated the development of enactive and iconic thought before language and independent of it. Enactive thought permits a child to do something in a different way without being told or shown. Iconic thought permits a child to solve design problems without access to language. The two types of thought are used by adults as well, but the demonstration of their independence of language is clearer in developmental terms.

There are actually many other types of thought that are not bound to verbalization; for example, quantitative thought and musical thought.

(vii) Thinking of the deaf. Hans Furth (1966) has demonstrated that deaf Ss can think in ways that are similar to those of hearing subjects.

"It has been shown that the intelligence of linguistically deprived deaf persons in development and maturity seems not basically different from that of the hearing..." (p. 168)

"At this point in our inquiry, we are actually no longer asking whether it is possible to think logically without enjoying linguistic competence. We know that it is possible with a degree of certitude that we would not dare assert if empirical observation of deaf persons had not provided a natural experiment crucis." (p. 169)

(viii) The developmental argument.

"A prelinguistic phase in the development of thought and a pre-intellectual phase in the development of speech are clearly discernible."
(Vygotsky, 1934, 1962, p. 41)

"The pre-intellectual roots of speech in child development have long been known. The child's babbling, crying, even his first words, are quite clearly stages of speech development that have nothing to do with development of thinking." (Ibid., p. 42)

"But the most important discovery is that at a certain moment at about the age of two the curves of development of thought and speech, till then separate, meet and join to initiate a new form of behavior." (Ibid., p. 43)

"In conclusion:

"1. In their ontogenic development, thought and speech have different roots.

"2. In the speech development of the child, we can with certainty establish a pre-intellectual stage, and in his thought development, a prelinguistic stage.

"3. Up to a certain point in time, the two follow different lines, independently of each other.

"4. At a certain point these lines meet, whereupon thought becomes verbal and speech rational."
(Ibid., p. 44)

Both Vygotsky (1934, 1962) and Piaget, (1926, 1959) agree that language and thinking are brought together at age two to three and that from this age through seven the child uses language both egocentrically and for communication. At about age seven the egocentric use of language becomes more fully socialized or logical according to Piaget, and it becomes inner speech and a tool for thinking according to Vygotsky.

My argument in support of hypothesis (1) is that thinking without language must continue after this age since it would be atypical in biological terms to have this capacity develop to a point and then disappear. My expectation is that thinking without language continues to develop and that language--both form and meaning--becomes a symbolic system to refer to thought. To be sure, language provides experience for thought, but thought has an autonomous trajectory in performance terms.

4. PILOT EXPERIMENTS

Three pilot experiments were conducted using techniques that contrast immediate and recall memory as the experimental device. By inference we are able in part to test the first two hypotheses.

EXPERIMENT 1

This experiment compared memory of an English text versus memory of the thought to which the text referred.[1] This experiment used a dictation technique by which different groups of subjects heard the same text in increasingly longer units.

A 194-word description of pottery making was read to four groups of subjects. The first group heard it with pauses after every fourth word

and the second group had the pauses after every tenth word. They wrote the words down during the pauses. The third and fourth groups heard the 194-word story without interruptions; group 3 wrote it down immediately upon completion, and the fourth wrote it down a day later. There were six subjects in each of the first three groups and only two in the last.

All the papers were scored for number of words reproduced in context, and the third and fourth group papers were scored also for the twenty ideas that constituted the story. In scoring for words in context, credit was given for each word in any sequence of two or more exactly matching the original. Single words were not credited since they would imply giving 100% credit for all the words even if they should be completely scrambled, which is absurd. The ideas on the other hand were credited even if the words were different.

As expected, the four-word group had an average sum of 99% on words in context. The ten-word group was lower, with an average of 83%. The break in reproduction of the text was clear with both the third and fourth groups: they reproduced only 16% and 11% of the text respectively. It is obvious that whatever the subjects could remember, it was not the sequence of words of the description they had heard.

On the other hand, the papers of the third group, which had reproduced only 16% of the words in context reproduced 74% of the original ideas; and the fourth group, which reproduced 11% of the words a day later, recalled 63% of the ideas.

The subjects, then, remember substantially the thought elements of the story but not the text. It they could not remember the text, they must have

remembered in something other than the text. And if they remember in non-linguistic terms, their thinking must have been centrally in those terms as they heard the text, since no other source of information was available.

I must emphasize the fact that the experiments were informally pilot experiments, and the results must be weighed accordingly.

EXPERIMENT 2

A second experiment[2] tested the translation interference hypothesis.

I used a 198-word English text and asked about half (31) of a class of seniors at the University of Madrid to study it. I took away the text about five minutes later. At the end of the class I asked this group to write the text in Spanish from memory. The other half of the class (27) were given copies of the same text and asked to translate it immediately into Spanish.

All the papers were scored for non-Spanish errors which could have resulted from interference from the English text. My own scores showed less than one error (.67) per paper on the recall group and 2.7 errors per paper on the translation group: a proportion of 3 to 1 confirming the hypothesis. Another scorer[3] went through the papers and recorded 6.8 and 2.8 errors per paper for the translation and recall groups respectively thus also confirming the hypothesis.

EXPERIMENT 3

This experiment by Jacqueline C. Smith[4] replicated experiment 2, using English and French instead of English and Spanish. The subjects were groups of 8th grade, 9th grade and College students studying French. The number of Ss was 53. The proportions of errors were 2.5 to 1 on the average,

confirming the greater interference of the translation groups. She also observed additional negative effects not shown by the statistics. For example, the translation papers presented "a somewhat awkward, unnatural or stilted style." Sentences were sometimes "unusually long and complicated, indicating the influence of the French text." The influence showed in the choice of words and in spelling confusions such as*appartment, *apartement, *adress, *officier, etc. The renarrations had a more natural and fluent style.

PROPOSED EXPERIMENT

Even if the findings of these pilot experiments are confirmed by controlled experiments we will not know if "thought" exercises will help in language learning; in other words, hypothesis 5 will have to be tested directly. For this purpose an experiment can be conducted comparing two equivalent groups of Ss, a thought group and a control group, on learning some specific grammatical or pronunciation problem. Both groups will receive equal instruction on the problem with examples, conscious practice, and pattern practice. At this point, the thought group will then advance to thought exercises and the control group will continue with pattern practice. Admittedly, measuring differences in learning will be difficult. Both groups will have to be measured on use of the problem when faced with a new situation in which they will concentrate on communication. A questionaire to check their motivation under both conditions, plus observation of the class performance, and debriefing reports should throw light on the effect of thought exercises on motivation also.

5. IMPLICATIONS

Thought Exercises

If the above hypotheses are confirmed there would be justification for adding a new generation of thought exercises to language teaching materials. A variety of such exercises can be readily created. A picture example of a particular type is as follows.

> Picture of a girl holding a flower in ger hand trying to put it in a vase which is too high to reach. In the room are a table, a chair, a box and a trunk. On the table are a pitcher and a glass. The thought problem: How can she put the flower in the vase? The linguistic problem: in, on, off. The thought problem admits a variety of solutions. The linguistic problem involves the use of put and get and other problems as well. This thought exercise comes on top of more controlled exercises.

Speed Reading

The phenomenon of meaningful reading at speeds in the thousands of words per minute which would seem to defy the perceptive speed of human sight, could be explained in terms of the thought view as thinking stimulated by partial bits of information from the page. If thinking had to be constructed in terms of well formed sentences, such speed would not seem possible. There are other implications of interest, but it would be dangerous to speculate any further without experimentation.

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NOTES

1. Unpublished notes by R. Lado and Luisa M. Atkinson.
2. Unpublished notes of pilot experiment by R. Lado, Madrid, Nov. 1967.
3. Rafael Hoyos
4. Unpublished term paper for course on methodology of language teaching.